

# MTH251 Data Structures and Algorithms I

**Level:** 2

**Credit Units:** 5 Credit Units

**Language:** ENGLISH

**Presentation Pattern:** EVERY JAN

## **Synopsis:**

MTH251 will provide students with an understanding of the common algorithms and data structures used in information technology. The topics covered are of central importance for many applications in data analytics and information technology. The course gives a comprehensive introduction to algorithm analysis, basic data types such as stacks, queues and trees and how these data types are implemented with linked lists. Codes will be written and presented in Python.

## **Topics:**

- Algorithm Analysis
- Asymptotic Analysis
- Analysing Recursive Algorithms
- Designing Recursive Algorithms
- Array-Based Sequences
- Multidimensional Data Sets
- Stacks
- Queues
- Linked Lists
- Positional Lists
- Trees
- Tree Traversal Algorithms

## **Textbooks:**

Michael T. Goodrich & Roberto Tamassia.: Data Structures and Algorithms in Python (eTextbook)  
Paperback Edition John Wiley  
ISBN-13: 9781118549582-AA

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**Learning Outcome:**

- Apply data structures to store and process information
- Analyze the efficiency of different algorithms
- Demonstrate advantages and disadvantages of specific algorithms and data structures
- Identify basic data structures and summarise their typical uses, strengths and weaknesses
- Determine bugs in program codes
- Solve problems computationally through the application of basic data structures and algorithms

**Assessment Strategies:**

<b>Continuous Assessment Component</b>	<b>Weightage (%)</b>
COMPUTER MARKED ASSIGNMENT	10
TUTOR-MARKED ASSIGNMENT	20
<b>Sub-Total</b>	<b>30</b>

<b>Examinable Component</b>	<b>Weightage (%)</b>
Written Exam	70
<b>Sub-Total</b>	<b>70</b>

**Weightage Total** **100**